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Complementarity in Future Selves: How Networks of Future-Oriented Cognitive Representations Influence Individuals' Ability to Proactively and Adaptively Manage Their Career

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Abstract. When thinking about one's future work life and career with its seemingly endless possibilities, individuals rarely have a singular "put together" vision of their future self, in which all components neatly fit together. We investigate how the complementarity of a future self impacts an individual's efforts to work toward their desired future career. We conceptualize and operationalize a future self as a network of future-oriented cognitive representations and complementarity as the extent of mutually beneficial connections in this network. We propose that future self complementarity amplifies the energizing effect of activated future self representations as it spreads across the network, enhancing vitality, and thus promoting proactive career behavior. In Study 1, we developed and validated a network-based measure to capture future self complementarity. In Study 2, we found, in a temporally lagged sample of 517 employees at 11 organizations, an indirect effect of future self complementarity on proactive career behavior through vitality. Study 3, a preregistered causal chain experiment, provided further support for this link. In Study 4, a preregistered field experiment, we again found an indirect effect of future self complementarity on proactive career behavior, assessed using a scale as well as a behavioral measure, via vitality.

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Individuals' sense of who they aspire to be in the future has the potential to benefit not only themselves but the organizations in which they work (Strauss et al. 2012, Ashforth et al. 2018). This future self (Markus and Nurius 1986, Strauss et al. 2012) provides a work-based destination at which to arrive (Ashforth and Schinoff 2016) and motivates behavior such as exploring, and preparing for, future career opportunities and proactively managing one's career (Strauss et al. 2012, Guan et al. 2017). Future selves, therefore, play a crucial role in key career-related processes such as adapting to new roles (Zhang et al. 2014) and responding to disruptive, critical events (Crawford et al. 2019)—a role that is only becoming more significant as the world of work grows increasingly uncertain and dynamic due to technological changes and the departure from traditional employment models.

Researchers and practitioners have proposed that, in order to best navigate a career, an individual's future self should be singular, clear, and focused (Holland et al. 1980b). A clear and focused image of one's desired future self is seen as critical for self-directed

career behaviors (Strauss et al. 2012) and a sense of purpose (Zhang et al. 2017), whereas a lack of connection to a specific work or career is linked with indecisiveness and discomfort (Duffy and Sedlacek 2007). However, when thinking about one's future, there is a seeming welter of endless possibilities. Thus, rather than concentrating on a singular, narrowly focused future self, we explore how individuals navigate the rich tapestry of desirable options and opportunities in order to manage their career.

To this end, we draw on research on network approaches to the self-concept (Ramarajan 2014, Bataille and Vough 2022) which proposes that the various elements that constitute a person's self-knowledge can be understood as nodes within a network and that the connections between these nodes are essential for understanding their consequences. We apply this theoretical lens to understanding the complex multitude of possibilities that make up a person's future self and resultant career behavior. As an example, a sales engineer may imagine her future self as someone successfully engaging in business development, as well as in technological development. Her future self may contain multiple (and, at times, juxtaposed) cognitive representations,[1] such as belonging to a particular professional group (e.g., mechanical engineer), while also identifying with an organizational role (e.g., technical sales), multiple envisioned role-relationships (e.g., with a technical mentor *and* with a strategic sales client), behaviors (e.g., my future self designs and creates *and* my future self negotiates and sells), and a host of trait-like descriptions (e.g., my future self enjoys deep-thought work *and* my future self likes to engage socially with clients; Brewer and Gardner 1996, Sluss and Ashforth 2007, Ashforth and Schinoff 2016). This multiplicity can potentially provide flexibility and adaptability, serving as a valuable source of energy in navigating dynamic career environments and providing her with room to maneuver, but it could also create tension and confusion.

We argue that to understand the effects of future selves, we need to consider how the cognitive representations contained in the future self relate to each other. We thus focus on *future self complementarity*, the mutually beneficial connections between an individual's future-oriented cognitive representations. By experiencing complementarity between cognitive representations, individuals can navigate the multiplicity of possibilities that make up their future self. If the sales engineer (in our example above) can see complementarity among the different representations (e.g., group memberships, role-relationships, and personal characteristics); this allows her to prepare for the future and take advantage of opportunities. Complementarity in future selves thus enables individuals to adapt and craft their career in the face of seemingly limitless possibilities.

Unfortunately, the literature on the role of future selves in career management remains underdeveloped and underspecified to address fully this essential but common situation. Prior research has explored how people develop visions or images of their future self that contain multiple roles (Ladge et al. 2012). Scholars have also acknowledged (theoretically, at least) that how the elements contained within a future self relate to each other is likely to be crucial, such that a *lack* of complementarity between them is likely to leave individuals "feeling stuck" (Sugiyama et al. 2024). Even with these hints, what is missing from the literature is the ability to systematically conceptualize and investigate how an individual's future self complementarity influences their ability to manage their career, including proactively developing skills and effectively preparing for future opportunities. Thus, we attempt to answer the following research question: What is future self complementarity, and how does it influence an individual's ability to proactively and adaptively manage their career?

To understand future self complementarity, we build and expand on recent network approaches to the self-concept (Ramarajan 2014, Wittman 2019, Bataille and Vough 2022) and propose that a future self can be thought of as a network of future-oriented cognitive representations and complementarity as the extent of mutually beneficial connections in this network. Future-oriented cognitive representations represent the knowledge or information about the future self which may "take the form of traits (extravert), roles (researcher, father), physical features (slim), category membership (male, black), behavior (jogger), abilities (analytical), […], and relations with others (loyal friend)" (Linville 1985, p. 96). Thus, the vision of the future self takes shape based on its representations (e.g., "My future self will be good at understanding new tech business use cases"; "My future self will encourage others") and the complementary connections between them.

Further, we aim to explain *how* future self complementarity may influence an individual's ability to proactively and adaptively manage their career, arguing that vitality—energy experienced as coming from the self (Ryan and Frederick 1997)—plays a crucial role. In the literature on multiple identities and network approaches to the self, "identities can be understood as knowledge categories that can be activated (and multiple identities can be coactivated) in an associative network" (Ramarajan 2014, p. 619). When future self representations are activated, they have an energizing effect that serves to fuel and organize action (Markus and Ruvolo 1989). In complementary future self networks, these energizing effects then spread to other interconnected representations (Anderson 1983) and become amplified, resulting in individuals deriving a stronger energizing effect from their future self and

therefore experiencing greater vitality. Thus, we investigate vitality as a key mediator for *how* future self complementarity influences an individual's career adaptability and proactivity.

Our paper offers three major contributions. First, drawing and building upon intrapersonal identity networks as a theoretical lens, we provide a novel approach to how individuals allow for the multiplicity of future possibilities while proactively and adaptively managing their careers. Our focus on complementarity challenges an important assumption within the careers literature that, for a future self to be fruitful, its salience (i.e., being "clear and easy to imagine"; Strauss et al. 2012, p. 581) and singularity are all that matters. Although future self salience is positively related to career planning, networking, and job search (e.g., Strauss et al. 2012, Guan et al. 2014), a focus on salience *without complementarity* does not take into account that images of one's possible future may include opposing characteristics (Ladge and Little 2019). Even though it is acknowledged that the future self may contain a more or less "diverse range of features" (Strauss et al. 2012, p. 583), the implicit assumption seems to be that these neatly fit together to provide a "mental image" that is "very clear" (Strauss et al. 2012, p. 584). This idea is also central in literature on vocational identity, where "the possession of a clear and stable picture of one's goals, interests, and talents" is seen as critical for individuals' career management (Holland et al. 1980b, p. 1191). Yet, a future self can be clear while still lacking complementarity, meaning that it contains disjointed or contradictory elements. Conversely, even a harder to imagine and less clear future self may motivate career-related self-regulation (here, career adaptability and proactive career behavior) when the individual finds complementarity between its elements. Thus, by recognizing the distinct and independent roles of salience and complementarity, we offer a more nuanced understanding of how individuals can harness their future selves to navigate their career.

Second, we introduce vitality, the sense of having personal energy available (Nix et al. 1999), as a key mechanism for how future self complementarity promotes career-related behavior. Within the careers literature, multiplicity (of career options) is often seen as *draining* psychological resources due to increased distraction and being "spread too thin" (Holland et al. 1980b; cf. Hall 2004). Understanding how individuals deal with this multiplicity requires a consideration of how multiple possibilities relate to each other. We propose that complementarity can *generate* resources—rather than drain them. With support from the multiple identities and identity networks literature (Ramarajan 2014), we argue that future self complementarity may be beneficial because it allows individuals to experience vitality. In complementary future selves, the energizing effect of future self representations (Markus and Ruvolo 1989) spreads to complementary representations, resulting in higher energy and therefore boosting vitality which, in turn, allows individuals to seize opportunities when they arise. We extend the careers literature by focusing on how future self complementarity may indeed provide (*rather than drain*) resources—in our case, vitality—leading, in particular, to proactivity as an important career dimension in today's organizational landscape (Jiang et al. 2023).

Third, we answer consistent calls for quantitative research on identity work, individuals' efforts of "forming, repairing, maintaining, strengthening or revising" their self-meanings (Alvesson and Willmott 2002, p. 626). As Caza et al. (2018b) argue, although the content of identity work is inherently idiosyncratic, the outcomes of identity work await quantitative measurement. As we develop a quantitative method for capturing complementarity between the cognitive representations within one's future self, scholars will be able to more systematically connect identity (and identity work processes) to established literatures that involve a future focus of the self-concept such as leadership development (Hammond et al. 2017) and role transitions (George et al. 2022).

Theory and Hypotheses

A future self reflects a person's representation of who they hope to become (Markus and Nurius 1986), including at work and in their career (Strauss et al. 2012). It forms part of the self-concept, alongside other types of selves, such as past or current selves (Markus and Wurf 1987). Future selves represent individuals' hopes and aspirations and motivate their efforts to shape their future (Strauss et al. 2012). For example, having a salient future self in relation to work predicts behaviors such as networking and proactive skill development (Strauss et al. 2012) and contributes to job search success (Fang and Saks 2022). Envisioning one's future self can also facilitate transitions (Ladge et al. 2012) and shape the individual's reactions to disruptive, critical events (Crawford et al. 2019). However, research to date has failed to consider that not all future selves are complementary. To understand how complementarity influences individuals, we conceptualize the future self as an intrapersonal network of future-oriented cognitive representations.

Future Selves as Networks of Cognitive Representations

It has long been acknowledged that the self-concept may be represented as an intrapersonal network of memory structures, group memberships, roles, relationships, skills, etc. (Bower and Gilligan 1979, Greenwald

and Pratkanis 1984). We view future selves as a network of cognitive representations. We then hypothesize how the complementarity among these representations influences energy and career-related self-regulation capacity and behavior.

Future Self Representations: Nodes in a Future Self Network

The representations contained within a future self reflect what people think about when they imagine "the type of person the future self will be" (Strauss et al. 2012, p. 590). A number of authors have listed possible categories of information about the self, spanning the personal, relational, and collective levels of self (Brewer and Gardner 1996). They include values; goals; beliefs; traits; knowledge, skills, and abilities; social roles; interpersonal relationships; group memberships; physical features; other people's feelings about the self; and critical self-relevant events (e.g., Linville 1985, Markus and Nurius 1986, Schleicher and McConnell 2005, Ashforth et al. 2008). Although there is significant overlap in the categories of representations put forth by different authors, only Schleicher and McConnell (2005) provide a theoretically grounded framework for the different categories of representations about the self, drawing on associated systems theory (Carlston 1992). Associated systems theory argues that in social cognition, representations can be conceptualized as an associative network. When individuals retrieve representations, activation spreads to associated representations along connecting pathways (Anderson 1983, Carlston 1992). Importantly, it proposes categories of representations, reflecting the separate and combined operations of the primary mental systems which govern sensory perception, language, affective responding, and action. Each system is hypothesized to utilize a form of representation that directly mirrors the inputs or outputs it processes (Carlston 1992). The visual system represents a person's appearance. The verbal system is made up of words and propositions, reflecting personality traits. The affective system pertains to the experience of emotions, and the action system represents behaviors. These systems produce eight forms of representations of the self that range from highly public and concrete (i.e., visual appearance) to highly private and abstract (i.e., personality characteristics) (Schleicher and McConnell 2005). Applying this framework, we conceptualize (and operationalize) eight types of representations contained within future selves: (1) visual appearance; (2) social categories; (3) behavior with others; (4) relationships with others; (5) evaluation by others; (6) behavior alone; (7) affective experiences; and (8) traits and characteristics.

Although this framework provides a strong theoretical grounding for the representations contained in the future self, it was developed for the current self-concept. Yet, future-oriented cognitive representations crucially form the basis of episodic prospection (i.e., "the mental simulation of a personal future event in rich contextual detail", Coughlin et al. 2019, p. 1109). Representations contained in the network provide the scaffolding or framework that enables episodic simulation of the future, giving acts of mental time travel their needed structure (Irish 2016). Reviewing the literature on episodic prospection, we identified two unique features of prospection that future-oriented cognitive representations need to support in addition to the types of representations introduced above. First, individuals regularly and spontaneously imagine future events related to their family life or career (Baumeister et al. 2020). Imagined future events provide key information about the future self. Additional support for their importance also comes from Linville (1987), who lists them as a key category of self-representations in relation to the current self. Second, episodic prospections include details concerning places (Szpunar et al. 2014, p. 18417), and the location of the future self is an important element of imagined futures (Jeunehomme and D'Argembeau 2021). The identity literature also supports the importance of the future self's physical surroundings. For example, Arshed et al. (2022) highlight the importance of place in the identity construction of entrepreneurs, and Ashforth et al. (2023) explore how physical workplaces interplay with individuals' sense of self. Based on research on episodic prospection which shows that mental simulation of the future relies on the construction of specific events and involves imagining the physical surroundings of the future self (Hassabis et al. 2007, Bertossi et al. 2016), we thus added (9) experiencing (imagined) events and (10) experiencing (imagined) surroundings to the framework of future-oriented cognitive representations. Definitions and examples of each of these 10 categories of future self representations, as well as, the full list of representations can be found in Online Supplement 1.

Connections Between Future Self Representations: Network Ties

With future self representations defined as network nodes, we now examine their connections. Above, we defined future self complementarity as the overall level of mutually beneficial connections in the future self network. A complementary connection between two representations reflects a mutually beneficial or helpful relationship, such that the two representations enhance each other. In the network, this is represented by a positive tie. Similarly, in the multiple identity literature, complementarity or enhancement refers to the experience of synergy among a person's identities (Ramarajan 2014). Ties can be absent or negative when representations are not complementary or even

in conflict (Ramarajan 2014, Bataille and Vough 2022). Conflicting relationships between incompatible components of the self are associated with negative outcomes such as lower well-being (Vough et al. 2024). The resulting "struggle to define oneself" is expected to drain individuals' energy (Ramarajan et al. 2017b). In future selves, conflicting ties similarly reflect tensions between individuals' multiple future self representations. Both negative and absent connections will prevent energy from spreading between representations. Importantly, the connections between representations are based on the individual's perception. Ties are thus idiosyncratic: where one person perceives a complementary connection between two representations, another person may not.

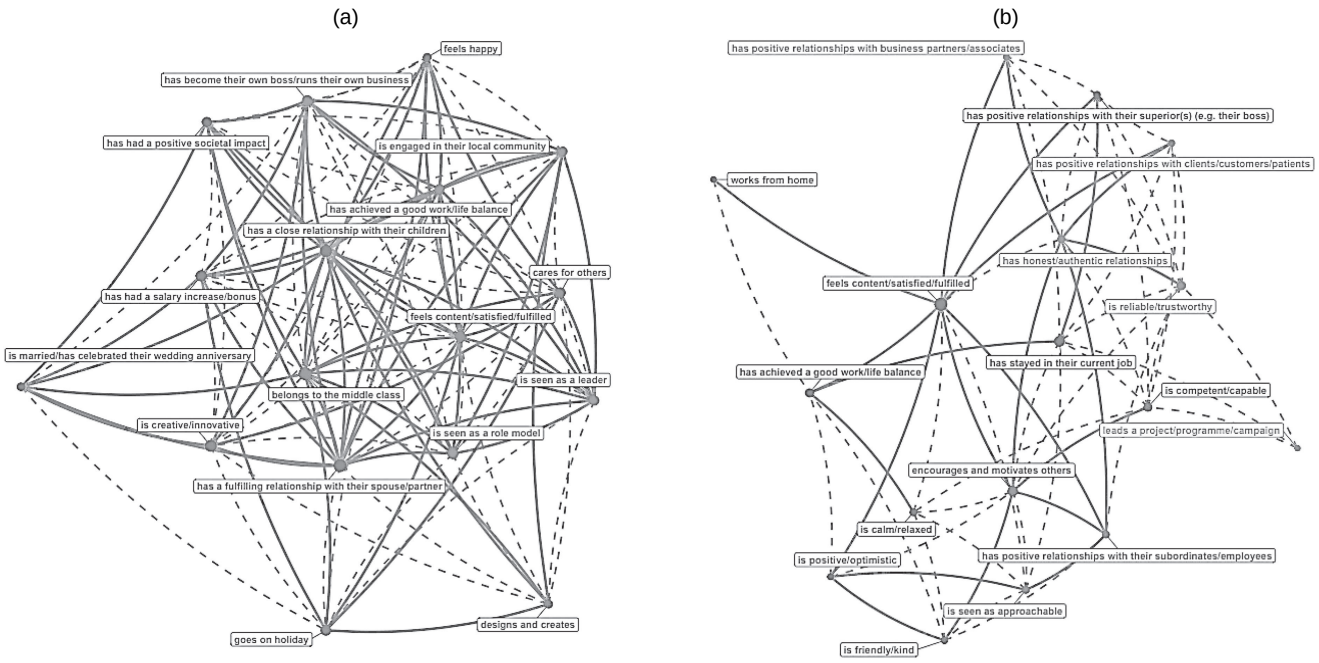
Career-Related Self-Regulation Capacity and Behaviors: Effects of Future Self Complementarity

Figure 1 illustrates how future selves can vary in complementarity. Complementary future selves are characterized by a high proportion of mutually enhancing connections. A future self "facilitat[es] positive adjustment by … shaping … the developmental activities [individuals] engage in" (Ashforth and Schinoff 2016, p. 114). We thus explore how future self complementarity drives individuals' efforts and capability to pursue their imagined future by investigating its impact on career-related self-regulation capacity and behavior. A network perspective suggests that complementarity promotes the individual's efforts toward becoming their future self—that is, adapting within their career and engaging in proactive career behaviors—for the following reasons.

In intrapersonal identity networks, the average strength of enhancing relationships among all identities determines whether the information associated with each identity is drawn upon when other identities are activated (Ramarajan 2014). Similarly, the level of enhancing relationships between future-oriented cognitive representations will allow them to be activated simultaneously. Just as "individuals experiencing identity compatibility are maintaining access to the full complexity of their multiple identities" (Rothbard and Ramarajan 2009, p. 131), future self complementarity enables individuals to access multiple future-oriented cognitive representations simultaneously.

As reference values in self-regulation (Hoyle and Sherrill 2006), representations of the future self in particular have an energizing effect that serves to fuel and organize behavior (Markus and Ruvolo 1989). Complementarity allows for the energy generated by future-oriented cognitive representations to spread throughout the network and become enhanced, rather than dissipating. As one representation of a person's future self is activated, the associated energy spreads to complementary representations and becomes amplified.

Figure 1. Examples of Future Self Networks



Notes. (a) Future self network high in complementarity. (b) Future self network low in complementarity. The dotted lines represent relationships rated as "helpful," and the solid lines represent relationships rated as "very helpful." Both networks in these examples are the same size (17 representations). The network in (a) has relatively high future self complementarity (1.33), whereas the network in (b) has relatively low future self complementarity (0.58).

This results in higher available energy levels, reflected in higher levels of vitality, the "feeling of aliveness and of possessing personal energy" (Nix et al. 1999, p. 268). Vitality reflects an individual's energetic resources which are essential for achieving personal and professional goals (Schmitt et al. 2017). The sense of well-being and aliveness distinguishes vitality from other states of arousal which can be negative in nature (Ryan and Frederick 1997). Vitality is considered as distinct from positive or pleasant affective states in general, but is most closely related to high activation positive affect (Nix et al. 1999). Vitality, in turn, connects complementarity with career-related self-regulation and behavior, as we elaborate below.

Career-Related Self-Regulation Capacity Effects: Career Adaptability. The energy reflected in vitality is, in turn, likely to promote career adaptability. Career adaptability is composed of concern, control, confidence, and curiosity, with each supporting career-related self-regulation (Savickas 1997). Concern enables individuals to orient themselves toward—and prepare for—the future; control allows them to exert self-discipline and effort to take responsibility for their career; curiosity reflects their openness to exploration; and confidence is their belief in their ability to overcome obstacles in pursuit of their aspirations (Savickas and Porfeli 2012).

Future self complementarity likely promotes career adaptability: First, it supports future focus and preparation—the concern component of career adaptability—because the energy-amplifying effects of complementarity provide individuals with the vitality required to focus on the future rather than on immediate benefits (Mischel 1996). A future self high in complementarity further enables individuals to take responsibility for the future, as they are not torn between different conflicting representations (the control component of career adaptability). Instead, future self complementarity allows them to think of their future self in a multidimensional, yet holistic, way, much like identity compatibility provides access to the full complexity of multiple identities (Rothbard and Ramarajan 2009). In contrast, conflicting relationships between components of the self activate incompatible norms and behaviors, resulting in inhibition and anxiety (Hirsh and Kang 2016), making it more difficult to assume responsibility for the future. Higher vitality also likely signals to individuals that they have sufficient energy available to bring about their desired future, resulting in higher positive expectations of being able to shape the future (Bandura 1977), promoting the confidence component of career adaptability. The positive experience of vitality resulting from complementarity will further result in a broadening of thought-action repertoires (Fredrickson 2001) and drive individuals to explore novel solutions (Kark and Carmeli 2009). Rothbard and Ramarajan (2009) similarly proposed that complementarity between identities is a positive experience which broadens cognition and behavior (Fredrickson 2001). This increased openness and exploration is likely to contribute to the curiosity component of career adaptability.

Thus, we hypothesize:

Hypothesis 1. *Future self complementarity is positively related to career adaptability.*

Hypothesis 2. *Future self complementarity has an indirect effect on career adaptability via vitality.*

Career-Related Behavioral Effects: Proactive Career Behavior. We further expect individuals with complementary future selves to be better able to shape, and prepare for, their desired future—that is, to engage in proactive career behavior. Proactive career behavior includes networking and developing skills not required in the current job but in future desired roles (Seibert et al. 2001, Strauss et al. 2012). Complementary future selves are more likely to motivate proactive career behaviors by enabling simultaneous access to multiple future-oriented cognitive representations. When relationships between representations are mutually reinforcing, energy spreads between them, allowing individuals to maintain high vitality levels as they pursue their future self. Having sufficient energy available will encourage further investment in proactive career behavior (Hobfoll 2001).

The vitality associated with a complementary future self provides individuals with the energy needed for proactive career behavior. Proactive behavior requires the "fuel" of high-energy states, such as feeling energized (Bindl et al. 2012), because its future-focused and change-oriented nature demands sustained motivation and persistence in the pursuit of challenging goals (Parker et al. 2010), which are facilitated by positive, high-energy states (Seo et al. 2004). In support of these arguments, Bindl et al. (2012) found that individuals experiencing high-energy positive states were more likely to engage in proactive career behavior. Porath et al. (2012) also found a positive relationship between a composite score of vitality and a sense of learning and the extent to which individuals took a proactive approach to managing their career. Therefore, we propose:

Hypothesis 3. *Future self complementarity is positively related to proactive career behavior.*

Hypothesis 4. *Future self complementarity has an indirect effect on proactive career behavior via vitality.*

In Study 1, we developed a measure to capture future self complementarity based on an intrapersonal future self representation network approach. In Study 2, we tested our hypotheses in a temporally lagged

sample of 517 employees from 11 companies across a range of sectors. In Study 3, we tested the relationships established in this field study using a preregistered experimental causal chain design. Finally, in Study 4, we conducted a preregistered field experiment assessing proactive career behavior via a scale, as well as a behavioral measure. Data and, where applicable, analysis code for Studies 1a–4, as well as all additional studies included in the online Supplement, can be found on the Open Science Framework (OSF): https://osf.io/bwgxq/?view_only=e77bbd789c7641609dd9f819b5f97765. Details on all measures are included in the final Online Supplement.

Study 1: Measure Development

To assess future self complementarity, we developed and validated a methodology to capture future selves as networks of future-oriented cognitive representations. We sought to present participants with a list of representations, from which they could select the ones that apply to their future self. This ensures that cognitive representations reside at the same level of abstraction, align closely with our theoretical framework, and are comparable between participants and over time.[2] In Study 1a, we generated a list of possible cognitive representations contained within future selves. Participants would select representations that apply to their future self from this list and report on the level of mutually beneficial connections among these representations. This resulted in their individual future self network, which formed the basis for calculating the complementarity measure. In Study 1b, we then established that future self complementarity is distinct from related concepts.

Study 1a: Generating a List of Future-Oriented Cognitive Representations

Procedure and Sample. To generate the list of possible cognitive representations contained in a future self, we adapted the procedure employed by Schleicher and McConnell (2005), who used an open-ended self-description task to elicit cognitive representations of the self. Correspondingly, we first asked participants to mentally travel into the future and think about their future self, using the instructions soliciting future selves in relation to work by Strauss et al. (2012). They were then asked to list up to 10 descriptions of their future self in each of the following categories: visual appearance of their future self; social, organizational, professional, political, societal, or ethnic groups their future self belongs to; relationships their future self has with others; how their future self would be seen or described by others; emotions or feelings their future self experiences; actions or behaviors their future self engages in, alone and with others; traits, abilities, and personality attributes of their future self; events their future self has experienced; and, finally, their future self's physical surroundings.

We recruited participants via Prolific, an online research subject pool developed specifically for the scientific community. Our sample consisted of 50 participants based in the United Kingdom with a mean age of 36 years (standard deviation (SD) = 10.3); 70% identified as female and 30% identified as male; and 60% had completed a college or university degree. Participants worked in a range of professions, the most frequent being business-related services (32%); management (14%); healthcare (12%); arts, humanities, and education (8%); IT and scientific services (8%); and food and hospitality (8%).

Analysis and Results. Participants generated 5,432 cognitive representations. Three of the authors coded these representations with the aim of capturing the most common representations while maintaining the breadth of representations that individuals imagine for their future self. In an iterative process, we took turns in going through the list of representations, either confirming codes or suggesting alternative ones. We resolved any remaining disagreements by discussing the representations one-by-one. In the first coding step, we grouped similar representations under a single code; for example, "calm", "relaxed", "comfortable", "less anxious", "serenity", "peace", "at ease", and similar expressions were grouped together as "calm and relaxed". To keep the list of future-oriented cognitive representations to a manageable length for research participants, we opted for broader descriptions capturing related ideas (e.g., "learns something new/studies/develops skills"). Where participants listed specific and relatively rare examples, we used a broader description to capture their representations. For instance, within the social categories and groups the future self would belong to, descriptions such as "feminist", "vegan", "nationalist", or "humanist" occurred only once and were thus summarized under "identifies with a political or ideological group". Similarly, individual professions (e.g., "lawyer", "engineer", "film maker") were summarized as "identifies with their specific field or profession". Representations that appeared nonsensical (e.g., "great behaviors") or trivial (e.g., "showering") were removed (376 such representations were dropped). The final list contained 206 future cognitive representations (see Online Supplement S1). To ensure that this list sufficiently captures most future self representations that individuals may have, we conducted an additional validation study in a population-representative sample of 301 adults in the United Kingdom (see Online Supplement S3).

Study 1b: Discriminant Validity of Future Self Complementarity

Having developed a list of future-oriented cognitive representations—that is, the network nodes—we

proceeded to establish that future self complementarity is distinct from conceptually related concepts. We thus examined the discriminant validity of future self complementarity.

Procedure and Sample. We recruited 179 native English speakers based in the United Kingdom through Prolific. We excluded 21 participants who incorrectly answered an attention-check item, leaving a final sample of 158 (60.8% female, 38.6% male; one participant chose not to disclose their gender). The mean age was 35 years ($SD = 9.5$), and 62.7% had completed a college or university degree. Participants worked in a range of professions, the most frequent being business-related services (21%). They received $9.40 for completing the survey.

Future Self Complementarity. Future self complementarity was captured as the overall level of mutually beneficial connections within a participant's future self network. To construct the future self network, participants were first presented with the list of 206 possible cognitive representations in random order. They initially selected all representations applicable to their future self. They then selected up to 25 representations[3] that they considered most important to their future self.

Next, participants rated the extent to which each pair of representations had a helpful effect on each other on a 5-point scale ranging from −2 (*Very harmful*) through 0 (*No effect*) to +2 (*Very helpful*) (cf. Brook et al. 2008). We considered the relationships between representations as bidirectional—that is, if A has a helpful effect on B, B will also have a helpful effect on A—in line with extant theory on identity conflict and enhancement (e.g., Ramarajan et al. 2017b) and with conceptualizing future selves as associative networks of representations. We then constructed the future self network from these responses. We operationalized future self complementarity as the valued density of the network of helpful relationships, recoding ties rated as *harmful* or *very harmful* as 0 and retaining ties that were rated as *helpful* (+1) or *very helpful* (+2). We computed valued density as the average of all ties in the resulting network (Wasserman and Faust 1994). Future self complementarity could then take values between zero and two.

Future Self Conflict. We also computed a measure of future self conflict—that is, the overall level of conflict between cognitive representations. To do so, we constructed a network of harmful relationships among the representations for each participant, here recoding each tie reported as *harmful* (−1) to 1, each *very harmful* tie (−2) to 2, and coding all other ties as 0. We then computed the valued density of this network as a measure of future self conflict.

In our data, conflictual relationships were rare, making up only 1.54% of all relationships between representations. Although our focus is on future self representations rather than on identities, this finding is in line with previous research which shows that conflict between identities occurs much less frequently than enhancement between identities (Ramarajan et al. 2017a, b). The low prevalence of conflictual relationships limits the ability of future self conflict to predict outcomes. Nevertheless, we intended to evaluate the effects of future self complementarity over and above future self conflict and therefore control for future self conflict in all analyses.

Conceptually Related Concepts. We sought to establish that future self complementarity is distinct from concepts reflecting clarity in relation to the current or future self or career. Unless otherwise noted, participants responded to all measures below on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

To establish that future self complementarity is distinct from having a clear and consistent view of one's self, we measured *self-concept clarity* ($\alpha = 0.92$) with the 12-item scale by Campbell et al. (1996); sample item: "In general, I have a clear sense of who I am and what I am." We further sought to differentiate future self complementarity from *vocational identity*, having a clear idea of one's career goals, interests, and abilities (Holland et al. 1980b). Although a clear view of the self or of one's future career may render cognitive representations of the future self more accessible in the working memory, their level of complementarity is distinct. Vocational identity ($\alpha = 0.90$) was assessed with 18 items by Holland et al. (1980a; sample item: "I am not sure that my present occupational choice or job is right for me.") Participants are required to make a *True* or *False* choice; the count of *False* responses is considered the vocational identity score, with a higher score indicating a higher level of vocational identity.

To differentiate future self complementarity from the extent to which a future self is clear and easy to imagine, we included *future self salience* (Strauss et al. 2012). Whereas salience may reflect how easily people create mental simulations of their imagined future, complementarity captures how the different representations they imagine relate to each other. A future self that is clear and easily accessible in a person's mind can motivate efforts to actively shape the future in relation to work (e.g., Strauss et al. 2012, Guan et al. 2014). But a clear future self may not be complementary. In a complementary future self, the different representations, such as envisioned activities, interactions, etc., are mutually beneficial. In contrast, a lack of complementarity would reflect fragmented scenarios of the future which may still be clear and easy to

imagine, yet not confer the benefits of complementarity. Future self salience ($\alpha = 0.93$) was assessed with five items by Strauss et al. (2012). A sample item was "The mental image of this future is very clear."

We further included *career identity*, the centrality of an individual's career to their self-definition (Carson and Bedeian 1994), and *career aspiration*, the extent to which they aspire to advancement in their career (O'Brien 1996). Both motivational career concepts are associated with a clearer vision of one's desired future self (Strauss et al. 2012). They are likely to be related to, yet distinct from, future self complementarity. Specifically, identifying strongly with one's career and striving for advancement may contribute to future self representations being crystalized around specific career goals, potentially promoting complementarity. Yet, complementarity captures a distinct quality: even if an individual strongly identifies with their career and its advancement, the representations within their future self may or may not be mutually beneficial. We measured career identity ($\alpha = 0.89$) with four items by Carson and Bedeian (1994). A sample item was "I strongly identify with my chosen career line." Career aspirations ($\alpha = 0.81$) were assessed with five items by O'Brien (1996). A sample item was "I hope to become a leader in my career field."

We also sought to differentiate future self complementarity from *future orientation*, the dispositional tendency to consider the future rather than immediate outcomes (Strathman et al. 1994), an established correlate of future self salience (Strauss et al. 2012). Individuals with a strong future orientation may spend more time considering the cognitive representations of their future self, providing them with more opportunities to build mutually beneficial relationships between them. However, considering future outcomes is distinct from the level of complementarity between representations. We assessed future orientation ($\alpha = 0.70$) with the six-item measure by Strauss et al. (2012), which is based on Strathman et al. (1994). A sample item was "I consider how things might be in the future, and try to influence those things with my day-to-day behavior."

Finally, we included *career adaptability* and *proactive career behaviors* for an initial test of their relationship with future self complementarity. Career adaptability ($\alpha = 0.91$) was measured with the 24-item scale by Savickas and Porfeli (2012), which captures individuals' self-regulatory strengths to adapt to career transitions and setbacks. Participants rate how strongly they have developed each strength on a 5-point scale ranging from *Not strong* (1) to *Strongest* (5). Example items are "Preparing for the future" (concern), "Making decisions by myself" (control), "Becoming curious about new opportunities" (curiosity), and "Overcoming obstacles" (confidence). We measured proactive career behavior ($\alpha = 0.89$) with nine items by Strauss et al. (2012), which were based on Claes and Ruiz-Quintanilla (1998), reflecting career consultation (i.e., informally seeking career advice), networking, and proactive skill development (i.e., the development of skills which may be useful in future positions). A sample item was "I develop knowledge and skill in tasks critical to my future work life."

Results and Discussion. Table 1 shows descriptive statistics and correlations. Participants initially selected an average of 87 representations for their future self in the first step and an average of 18 representations that they considered to be most important for their future self in the second step.

Future self complementarity was not related to measures which capture clarity rather than complementarity—that is, to future self salience, self-concept clarity, or to vocational identity. It was also not significantly related to career identity, career aspirations, or future orientation. This provides support for its distinct nature. Importantly, future self complementarity was significantly related to career adaptability ($r = 0.27$, $p < 0.001$) and proactive career behavior ($r = 0.19$, $p = 0.01$).[4]

In this initial study, we found preliminary support for the distinct quality of future self complementarity. Our results showed that the extent of mutually beneficial connections between the representations individuals imagine for their future self is distinct from having a clear image of one's future self or future career.[5] In Study 2, we then proceeded to formally test our hypotheses.

Study 2

Procedure and Sample

We recruited participants from a range of different sectors in Belgium. Participating organizations were recruited by a call on a human resources (HR) discussion group on LinkedIn that invited companies to participate in a study on future-oriented thinking in organizations. Eleven organizations took part in the study: two banks, three HR services providers, two research institutions, a city council, a waste recycling company, a dredging company, and an insurance company. In each participating company, the HR manager sent out an invitation for the study to employees. In return for their participation, all participants received a customized feedback report visually depicting their own future self network and providing relevant career tips.

Participants completed an initial survey, including the future self assessment, at Time 1, and two weeks later were invited to a second survey which assessed career adaptability and proactive career behavior. At Time 1, 676 participants responded, and of these,

Table 1. Study 1b: Descriptive Statistics and Intercorrelations

Variable	*n*	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. *Age*	158	34.97	9.5														
2. *Gender* (0 = male, 1 = female)	157	0.61	0.49	−0.14													
3. *Education*	158	5.18	1.18	−0.08	0.25**												
4. *Initial number of representations*	158	86.63	41.00	−0.28***	0.06	0.15											
5. *Future self network size*	158	18.08	7.01	−0.30***	0	0.15	0.59***										
6. *Future self complementarity*	158	1.12	0.4	0.03	0.07	−0.1	0.03	−0.12									
7. *Future self conflict*	158	0.02	0.04	−0.19*	−0.06	0.02	0.17*	0.16	−0.11								
8. *Future self salience*	158	3.46	1.04	0.21**	0.12	0.04	0.03	−0.02	0.14	−0.03							
9. *Career identity*	158	3.52	1.06	0.04	0.05	0.11	−0.01	0	0.14	0.06	0.43***						
10. *Career aspirations*	158	3.59	0.92	−0.17*	0.13	0.20*	0.29***	0.14	0.10	0.27***	0.29***	0.39***					
11. *Future orientation*	158	3.64	0.59	−0.1	−0.01	0.07	0.09	0.1	0.03	0.1	0.37***	0.18*	0.42***				
12. *Vocational identity*	158	0.55	0.29	0.33***	0.05	0.04	−0.07	−0.15	−0.01	−0.12	0.53***	0.32***	0.13	0.13			
13. *Self-concept clarity*	158	3.12	0.93	0.24**	0	0	−0.08	−0.14	0.04	−0.07	0.35***	0.01	0.01	0.11	0.59***		
14. *Career adaptability*	158	3.30	0.59	−0.02	−0.03	0.01	0.14	0.1	0.26***	0.1	0.50***	0.25**	0.41***	0.48***	0.27***	0.22**	
15. *Proactive career behavior*	158	3.50	0.84	−0.07	0.12	0.12	0.26**	0.1	0.19*	0.12	0.55***	0.40***	0.56***	0.37***	0.31***	0.11	0.58***

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

557 (83.9%) responded at Time 2.[6] Although we did not include attention checks in this study, we excluded two participants whose future self conflict scores were 13.0 and 13.7 standard deviations above the mean, respectively, resulting in a final sample of 565 participants.[7] In this sample, 58.9% identified as female and 40.2% as male; five participants indicated other gender identities or did not disclose. Of the participants, 40% held a position without supervisory responsibilities, 13.1% were first-level supervisors, 19.3% were middle management, 16.6% were upper middle management, 8% were executives, and 2.8% were top executives. The mean age was 41.3 ($SD = 9.7$). The majority of respondents (91.9%) had completed a university degree.

Measures

Time 1. *Future self complementarity* and *conflict* were measured as in Study 1b. To reduce the demands placed on participants, we set the maximum number of representations they could select to 20 and presented possible representations grouped by category. *Future self salience* (five items, $\alpha = 0.91$) was assessed as in Study 1b above, and *career identity* (three items, $\alpha = 0.87$) and *future orientation* (three items, $\alpha = 0.60$), the most important correlates of future selves, were assessed with the three-item measures by Strauss et al. (2012; study 1b in their paper). *Vitality* ($\alpha = 0.90$) was assessed with the three items by Porath et al. (2012) that had the highest factor loadings in their study of a sample of professionals. A sample item was "At work, I feel alive and vital".

Time 2. *Career adaptability* (24 items, $\alpha = 0.91$) and proactive career behavior (9 items, $\alpha = 0.84$) were assessed with the same measures as in Study 1b.

Results and Discussion

Descriptive statistics and intercorrelations between study variables are shown in Table S5.1 in Online Supplement S5. We tested our hypotheses using hierarchical linear regressions, controlling for age, future self salience, career identity, future orientation, the size of the network, and future self conflict. We included dummy controls for organizations and controlled for participants' hierarchical level because opportunities for skill development and networking likely vary across organizational contexts and ranks. We dropped four observations due to list-wise deletion for missing data.

The results are shown in Table 2. As predicted, future self complementarity was significantly related to career adaptability ($B = 0.24$, standard error (SE) = 0.07, $t = 3.63$, $p < 0.001$) and proactive career behavior ($B = 0.28$, $SE = 0.07$, $t = 3.83$, $p < 0.001$), assessed two weeks later, after controlling for established predictors.

Table 2. Study 2: Hierarchical Linear Regression Models Predicting Vitality, Career Adaptability, and Proactive Career Behavior

	Vitality				Career adaptability						Proactive career behavior					
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
Variable	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Constant	1.66***	(0.29)	1.47***	(0.30)	1.97***	(0.20)	1.77***	(0.20)	1.69***	(0.21)	1.91***	(0.22)	1.68***	(0.23)	1.47***	(0.23)
Age	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	−0.01*	(0.00)	−0.01**	(0.00)	−0.01**	(0.00)
Hierarchical level	0.06*	(0.03)	0.06*	(0.03)	0.03	(0.02)	0.03	(0.02)	0.03	(0.02)	−0.01	(0.02)	0.00	(0.02)	−0.01	(0.02)
Career identity	0.33***	(0.04)	0.33***	(0.04)	0.05	(0.03)	0.04	(0.03)	0.02	(0.03)	0.20***	(0.03)	0.19***	(0.03)	0.14***	(0.03)
Future orientation	−0.05	(0.05)	−0.07	(0.05)	0.15**	(0.03)	0.13***	(0.03)	0.14***	(0.03)	0.19**	(0.04)	0.17***	(0.04)	0.18***	(0.04)
Future self salience	0.19***	(0.04)	0.18***	(0.04)	0.12***	(0.03)	0.11***	(0.03)	0.10***	(0.03)	0.11***	(0.03)	0.10***	(0.03)	0.07**	(0.03)
Future self network size	0.00	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01**	(0.01)	0.01**	(0.01)	0.01	(0.01)	0.01*	(0.01)	0.01**	(0.01)
Future self conflict	−0.39	(0.63)	−0.14	(0.63)	0.35	(0.43)	0.61	(0.43)	0.61	(0.43)	−0.65	(0.48)	−0.34	(0.49)	−0.32	(0.48)
Future self complementarity			0.23*	(0.10)			0.24***	(0.07)	0.22	(0.07)			0.28***	(0.07)	0.25***	(0.07)
Vitality									0.06*	(0.03)					0.15***	(0.03)
R^2	0.26		0.27		0.17		0.19		0.20		0.26		0.28		0.30	
ΔR^2			0.01*				0.01***		0.01*				0.02***		0.02***	

Notes. $n = 561$ after listwise deletion of four participants due to missing data. To control for the organization, the 10 dummy variables were included in all models but for the sake of parsimony not shown in the table. Unstandardized regression coefficients are displayed with standard errors in parentheses. Tests are two-tailed.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

These results provide further support for Hypotheses 1 and 3. For a one-standard-deviation increase in future self complementarity, career adaptability is expected to increase by approximately 0.08 units (equivalent to a 0.14-SD increase), and proactive career behavior is expected to increase by approximately 0.10 units (equivalent to a 0.15-SD increase). We compared these effect sizes with those of the established predictors included in our models: For a one-standard-deviation increase in career identity, career adaptability increased by ca. 0.04 units and proactive career behavior by ca. 0.18 units; for a one-standard-deviation increase in future self salience, career adaptability increased by ca. 0.11 units and proactive career behavior by ca. 0.10 units. Thus, the effect sizes of future self complementarity fall within a range comparable to those of established predictors.

To test the mediation hypotheses, we used the PROCESS macro (Hayes 2022) using 10,000 bootstrap estimates. Hypotheses 2 and 4 proposed an indirect effect of future self complementarity (Time 1) via vitality (Time 1) on career adaptability (Time 2) and proactive career behavior (Time 2), respectively. Future self complementarity was significantly related to vitality ($B = 0.22$, $SE = 0.10$, $t = 2.34$, $p = 0.02$). There was no support for an indirect effect of future self complementarity on career adaptability via vitality ($B = 0.013$, 95% confidence interval (CI) [−0.002, 0.035]); thus, Hypothesis 2 was not supported. However, future self complementarity had an indirect effect on proactive career behavior via vitality ($B = 0.03$, 95% CI [0.002, 0.073]), supporting Hypothesis 4.

Study 2 provided support for the relationship of future self complementarity with career adaptability and proactive career behavior and for vitality as a key mechanism in the relationship between future self complementarity and proactive career behavior. This suggests that individuals with a more complementary future self experience higher levels of energy, which they are able to invest in proactive career behavior. There was no indirect effect of future self complementarity on career adaptability via vitality, suggesting that mechanisms other than energy translate complementarity into the self-regulatory strengths of concern, control, curiosity, and confidence.

Study 3

The results of Study 2 support our theorizing that in more complementary future selves, energy spreads along mutually enhancing connections between representations, resulting in higher levels of vitality and thus in more proactive career behavior. However, despite a temporal separation of measures, Study 2 cannot rule out the possibility of reverse causality. Thus, to establish the proposed causal relationships,

we conducted a set of preregistered causal chain experiments (Spencer et al. 2005). Causal chain experiments establish mediating mechanisms through separate studies, one involving the manipulation of the independent variable (future self complementarity) and testing the effect on the mediator (vitality, Study 3a), and one manipulating the mediator (vitality) and testing the effect on the dependent variable (proactive career behavior, Study 3b). Causal chain designs provide stronger evidence for mediation than designs in which only the independent variable is manipulated and the mediator is measured (Spencer et al. 2005).

Study 3a

The aim of this study was to test the causal effect of future self complementarity on the mediator, vitality. The study was approved by the Institutional Review Board of the second author's institution (protocol number ETH2223-0522) and preregistered at AsPredicted.org (https://aspredicted.org/8TK_KL1).

Procedure and Sample. We recruited a sample of full-time employees through Prolific for a compensation of £5. Using the software G*Power (Faul et al. 2009), we first calculated the required sample size based on a conservative estimation of a small effect, at a statistical power of 0.80 and a significance level of 0.05 (one-tailed) (Cohen 1992, Cho and Abe 2013). Anticipating the exclusion of some cases based on data screening (see below), we aimed to recruit 340 participants. For technical reasons with the research platform, 343 responses were recorded, and after the deletion of 15 cases,[8] our final sample consisted of 328 participants (165 women, 162 men; one participant did not disclose their gender; average age = 39.73, $SD = 10.74$).

Participants were randomly assigned to one of two conditions—high future self complementarity and low future self complementarity. All participants first went through the first stage of the future self complementarity measurement, as implemented in Study 2, selecting between 2 and 20 future self representations. Next, participants were presented with 15 randomly selected pairs of representations and asked to reflect on how they influence each other. For each pair, they were asked to write a brief text (minimum 100 characters) explaining how they perceived the effect of the representations on each other and to rate this effect on a five-point Likert scale ranging from −2 (very harmful effect) to +2 (very helpful effect). Here, participants in the high future self complementarity condition were instructed to particularly focus on the positive effects that the representations could have on each other, whereas participants in the low future self complementarity condition were instructed to think carefully about whether the two representations indeed had a positive effect on each other. Table S9.1 in Online Supplement 9 presents the full instructions. Finally, participants responded to three items measuring vitality, as in Study 2 ($\alpha = 0.94$).

Analyses and Results. As a manipulation check, we constructed a measure of future self complementarity adapted to the partial random sampling of ties, constructing a positive ties network by retaining all ties evaluated as helpful (+1) or very helpful (+2) and coding all other ties as absent (0). Analogously to the full network density measure, we calculated the average of the positive ties network. As expected, future self complementarity was higher in the high complementarity condition (mean (M) = 1.32, $SD = 0.33$) than in the low complementarity condition ($M = 1.15$, $SD = 0.37$), $t(326) = 4.54$, $p < 0.001$, one-tailed. We then tested the effect of our manipulation on vitality. As predicted, vitality was higher in the high future self complementarity condition ($M = 3.62$, $SD = 1.01$) than in the low future self complementarity condition ($M = 3.36$, $SD = 1.05$), $t(226) = 2.31$, $p = 0.011$, one-tailed. Thus, our results provide support for the first link of the causal chain, establishing the relationship between future self complementarity and vitality.

Study 3b

In Study 3b, we then sought to test the causal effect of the mediator, vitality, on proactive career behavior. The study was approved by the Institutional Review Board of the first author's institution (protocol number 2023-14) and preregistered at AsPredicted.org (https://aspredicted.org/SHJ_FNY).

Procedure and Sample. As in Study 3a, we recruited 340 full-time employees through Prolific. Participants received £0.90. As preregistered, we excluded six participants who failed to respond correctly to an instructed response item, resulting in a final sample of 334 participants (192 women, 139 men; three participants did not disclose their gender; average age = 37.81, $SD = 11.14$).

Vitality was manipulated with an established manipulation by Wörtler et al. (2020). Participants were randomly allocated to one of two conditions. In the high vitality condition, they had to recall a workday on which they experienced a high sense of vitality. In the low vitality condition, they had to recall a workday on which they did not experience a sense of vitality. In both conditions, they then described in detail the events of that day, as well as their thoughts and feelings.

As a manipulation check, we measured vitality with the same three items as in Study 3a ($\alpha = 0.96$), adapted to the workday participants had recalled, as in the study by Wörtler et al. (2020). Participants' vitality was higher in the high vitality condition ($M = 4.51$, $SD = 0.61$) than in the low vitality condition ($M = 1.64$, $SD = 0.74$; $t(332) = 38.76$, $p < 0.001$, one-tailed).

To assess proactive career behavior ($\alpha = 0.83$), we adapted the highest loading items of each dimension of proactive career behavior by Strauss et al. (2012; study 1a in their paper) into a measure of behavioral intent. Following Wörtler et al. (2020), we asked participants to consider the workday they had been asked to recall. They then rated how likely (on a five-point scale) they were to seek advice on their career, proactively develop skills, etc. A sample item is: "Imagine the company you work for offers a voluntary training and development program. How likely are you to take part in training in order to develop knowledge and skills in tasks critical to your future work life?" (see Online Supplement S9 for the complete measure).

Analyses and Results. As predicted, participants in the high vitality condition reported a higher intention to engage in proactive career behavior ($M = 3.79$, $SD = 0.86$) than those in the low vitality condition ($M = 2.82$, $SD = 1.05$), $t(332) = 9.23$, $p < 0.001$, one-tailed). This supports the second part of our hypothesized causal chain, linking vitality to proactive career behavior.

Study 3 complements Study 2 by providing additional support for the energy-generating effects of future self complementarity using a causal chain design (Spencer et al. 2005). Higher future self complementarity resulted in higher levels of vitality, and higher vitality was, in turn, linked to greater intentions to engage in proactive career behavior.

Study 4

Although causal chain designs are an appropriate way of establishing causality when the mediator is both easy to manipulate and measure (Spencer et al. 2005), Study 3 also had limitations. We used a survey-based measure of participants' intent to engage in proactive career behavior as the outcome variable, rather than a true behavioral measure. To provide further causal evidence for the effect of future self complementarity on individuals' proactive career behavior, we thus conducted a preregistered field experiment in a cohort of business students.

Pilot Study

To manipulate future self complementarity in the field experiment, we embedded the manipulation in an in-person workshop. We adjusted the future self complementarity manipulation used in Study 3a to this context, replacing the low complementarity condition with a neutral control condition. We piloted this adapted manipulation in an online sample of 80 individuals recruited through Prolific (39 female, 39 male, 2 did not disclose their gender; age: $M = 35.6$, $SD = 9.21$), who were paid £4.50. They first selected between 4 and 15 future self representations,[9] then reflected on the complementarity of representations in five randomly selected pairs and submitted brief (min. 100 characters) explanations thereof and, finally, rated all pairs of representations constituting their future self. Participants were randomly assigned to a control ($n = 43$) and a treatment ($n = 37$) condition. Participants in the control condition were asked to reflect carefully on whether representations in each pair have a helpful, harmful, or no effect on each other, whereas participants in the treatment condition were instructed to consider especially the positive influence each pair of future self representations could have on each other (see Table S10.1 in Online Supplement 10 for full instructions). As a manipulation check, we computed participants' future self complementarity as in Study 1b as the valued density of the network of helpful relationships. Future self complementarity was significantly higher in the treatment group ($M = 1.25$, $SD = 0.35$) than in the control group ($M = 1.09$, $SD = 0.42$; $t(78) = 1.76$, $p = 0.041$, one-tailed). Furthermore, we checked whether the manipulation also resulted in a significant difference in proactive career behavior, captured using the same four-item behavioral intentions scale as in Study 3b ($\alpha = 0.79$), and in vitality, assessed with the same three items as in Study 3a ($\alpha = 0.93$). Proactive career behavior was significantly higher in the treatment group ($M = 4.22$, $SD = 0.66$) than in the control group ($M = 3.76$, $SD = 0.97$; $t(78) = 2.48$, $p = 0.008$, one-tailed). Vitality was marginally higher in the treatment group ($M = 3.42$, $SD = 1.07$) than in the control group ($M = 3.02$, $SD = 1.15$; $t(78) = 1.63$, $p = 0.053$, one-tailed). We thus proceeded to the main study.

Sample and Procedure

We recruited first-year students across two business programs (business administration and international business administration) at a university in the Netherlands in 2024. The study was approved by the Institutional Review Board of the second author's institution (protocol number ETH2324-0562) and preregistered at AsPredicted.org (https://aspredicted.org/WD7_6CB).

The intervention was embedded in a mandatory workshop that concluded a course on professional development. It was accompanied by a preworkshop homework survey, a postworkshop homework, and a follow-up survey. In total, 1,154 students were assigned to 148 workshops run by 37 teaching assistants (each teaching assistant ran 4 workshops), who followed a script and were blind to our hypotheses. Given the interactive nature of the workshop and the increased likelihood of interaction between students in different workshops led by the same teaching assistant, we randomized assignment to two conditions (control versus treatment) at the level of the teaching assistants. Thus, 72 workshops led by 18 teaching assistants were assigned to the control condition, and

76 workshops led by 19 teaching assistants were assigned to the treatment condition. We made sure that we had an even distribution of conditions across the two study programs and that the gender of teaching assistants was counterbalanced across conditions.

We included students in the sample who (a) consented to their data being used for research, (b) completed the preworkshop homework, (c) participated in their assigned workshop where the intervention took place,[10] and (d) completed the follow-up survey containing the dependent variables.[11] Our final sample consisted of 458 students (247 male, 202 female, 9 did not identify) distributed across 137 workshops (11 workshops did not contain any students included in the sample). A total of 205 students were in the control condition, and 253 were in the treatment condition. The average age was 18.39 ($SD = 1.00$). Students stemmed from 53 different countries; the majority identified as Dutch (37.8%), French (10.0%), and German (9.2%).

Students selected between 4 and 15 future self representations in a preworkshop homework survey. During the workshop, they were led through a two-step reflection task: First, students were presented with five randomly selected pairs of their future self representations, discussed with another student how the representations influenced each other, and submitted a brief statement describing the relationship for each pair. Then, they individually rated the complementarity of all pairs of their representations. Students received different instructions in the two conditions (see Table S10.1 in Online Supplement 10). Upon completion of this task, each student received a graphical representation of their future self network. Finally, between one and four weeks after their workshop (depending on the scheduling of the workshop), students received a follow-up survey,[12] and they were invited to sign up for additional career-related workshops.

Measures

Future Self Complementarity. As a manipulation check, we computed future self complementarity as the valued density of the network of helpful relationships.

Vitality. We measured vitality immediately after students completed the reflection task in the workshops, adapting the three vitality items used in Studies 2 and 3 to the workshop context by changing the stem from "at work" to "right now"—for example, "Right now, I feel alive and vital" ($\alpha = 0.78$).

Proactive Career Behavior. We measured proactive career behavior in two ways: First, we included the nine-item measure used in Studies 1b and 2 ($\alpha = 0.86$) in the follow-up survey. To check for pretreatment differences, we also included this measure in the preworkshop homework survey. Second, as a behavioral measure of proactive career behavior, we offered students the opportunity to sign up for up to three additional career-related workshops on the topics of presentation skills, networking, and career advice seeking, which were presented as a free "summer school" in the first week of holidays. Our measure was the number of workshops for which a student signed up.

Career Adaptability. Even though we had not found a significant indirect effect of future self complementarity on career adaptability via vitality in Study 2, we included career adaptability as an outcome in Study 4. To check for pretreatment differences, we also included this measure in the preworkshop homework survey. We measured career adaptability ($\alpha = 0.91$) with a shortened 12-item measure based on Savickas and Porfeli (2012) and report the shortening procedure in Online Supplement 11.

Results

The manipulation successfully increased future self complementarity in the treatment condition ($M = 1.11$, $SD = 0.32$) compared with the control condition ($M = 0.99$, $SD = 0.31$, $t = 4.09$, $p < 0.001$). Table 3 presents the cell means and standard deviations of future self complementarity, vitality, career adaptability, and proactive career behavior, as well as the pretreatment levels of proactive career behavior and career adaptability. It also shows simple *t*-tests comparing the means. Notably, the means of proactive career behavior measured through workshop signups were low across both conditions, reflecting that most students did not choose to participate in additional workshops during their

Table 3. Study 4: Differences in Means Between Experimental Conditions

Variable	Control condition, *M* (*SD*)	Treatment condition, *M* (*SD*)	*t*	*p* (one-tailed)
Future self complementarity	0.99 (0.31)	1.11 (0.32)	4.09	<0.001
Vitality	3.87 (0.74)	4.00 (0.72)	1.92	0.028
Career adaptability	3.57 (0.65)	3.59 (0.68)	0.35	0.362
Proactive career behavior (scale)	3.63 (0.7)	3.79 (0.62)	2.63	0.004
Proactive career behavior (workshop signups)	0.00 (0.07)	0.06 (0.41)	–	–
Career adaptability (pretreatment)	3.51 (0.60)	3.63 (0.61)	2.12	0.017
Proactive career behavior (scale pretreatment)	3.56 (0.68)	3.72 (0.64)	2.59	0.005

holidays. In the control condition, only one student from our final sample signed up for any workshops, and in the treatment condition, only six students signed up for any workshops.

We unexpectedly found significant pretreatment differences in proactive career behavior and career adaptability, despite the random assignment to conditions, and thus controlled for the pretreatment levels of the respective outcome in all models predicting outcomes. Given the nonindependence of observations within workshops, we clustered standard errors by workshop in the regressions (Cameron and Miller 2015, Pustejovsky and Tipton 2018). To test the indirect effects on proactive career behavior and career adaptability measured through survey measures, we used a cluster bootstrap procedure in which clusters (rather than individual observations) are resampled with replacement (Field and Welsh 2007),[13] using 10,000 bootstrap samples. For the behavioral measure of proactive career behavior, which is a count variable, we used the *mediation* package in R (Imai et al. 2010, Tingley et al. 2014) to calculate the average causal mediation effect, again using a cluster bootstrap procedure with 10,000 samples to calculate its confidence interval. For all indirect effects, we calculated 90% confidence intervals to provide a one-tailed test of our directed hypotheses.

Table 4 shows the regression models. Although, contrary to Hypothesis 1, there was no total effect of the treatment on career adaptability (Model 2: $B = -0.05$, $SE = 0.06$, $p = 0.39$, one-tailed), there was a significant indirect effect of the treatment on career adaptability via vitality ($B = 0.016$, 90% CI = [0.003; 0.032]), lending support to Hypothesis 2. For proactive career behavior, the total effect of the treatment on proactive career behavior was marginally significant when measured through the scale (Model 4: $B = 0.08$, $SE = 0.05$, $p = 0.06$, one-tailed) and significant when measured behaviorally (Model 6: $B = 2.35$, $SE = 1.10$, $p = 0.02$, one-tailed), thus providing partial support for Hypothesis 3. The indirect effect of the treatment on proactive career behavior via vitality was significant for the scale measure ($B = 0.011$, 90% CI = [0.001; 0.027]) and for the behavioral measure (average causal mediation effect = 0.006, 90% CI = [0.001, 0.023]), supporting Hypothesis 4.

Discussion

Overall, Study 4 provided further support for Hypotheses 3 and 4. Proactive career behavior was significantly higher in the high future self complementarity condition in the pilot study and the main study. Controlling for pretreatment proactive career behavior, the experimental treatment was significantly related to proactive career behavior assessed via a behavioral measure, and the results provided consistent support

Table 4. Study 4: Regression Models Predicting Vitality, Career Adaptability, and Proactive Career Behavior

	Vitality	*Career adaptability*	*Career adaptability*	*Proactive career behavior (scale)*	*Proactive career behavior (scale)*	*Proactive career behavior (behavioral)*	*Proactive career behavior (behavioral)*
Variable	Model 1 (OLS)	Model 2 (OLS)	Model 3 (OLS)	Model 4 (OLS)	Model 5 (OLS)	Model 6 (Poisson)	Model 5 (Poisson)
Intercept	3.87 (0.05)***	1.47 (0.18)***	1.14 (0.20)***	1.71 (0.22)***	1.47 (0.25)***	−12.31 (3.90)***	−16.80 (3.52)***
Treatment condition	0.13 (0.08)*	−0.05 (0.06)	−0.06 (0.06)	0.08 (0.05)$^{+}$	0.07 (0.05)$^{+}$	2.35 (1.10)*	2.33 (1.08)*
Vitality			0.12 (0.04)*		0.09 (0.05)*		1.58 (0.79)*
Career adaptability (pretreatment)		0.60 (0.05)***	0.56 (0.05)***				
Proactive career behavior (pretreatment)				0.54 (0.06)***	0.51 (0.06)***	1.78 (0.92)*	1.18 (0.95)
R^2	0.01	0.28	0.31	0.30	0.31		
F	3.67*	96.35***	69.01***	97.53***	67.50***		
Log Likelihood						−66.61	−61.25
AIC						139.22	130.49

Note. Standard errors are clustered by session.
$^{+}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$; all one-tailed.

for an indirect effect via vitality. On career adaptability, support was mixed. Although there was evidence of an indirect effect via vitality, supporting Hypothesis 2, contrary to Hypothesis 1, there was no total effect of the treatment on career adaptability.

General Discussion

Future selves are crucial for individuals to prepare for and navigate their careers and take advantage of skill-building opportunities. Indeed, individuals frequently face a plethora of future possibilities for "who they might become." Thus, they need to find some level of complementarity among these multiple representations contained within their future self to prepare for the future. Unfortunately, the literature on the role of future selves in career management is woefully underdeveloped to address this situation—lacking a conceptualization and operationalization of complementarity that helps us understand how individuals self-regulate to proactively develop skills and adaptively prepare for future career opportunities amid the multiplicity of future possibilities.

To expand theory on future selves, we conducted four studies to answer an overarching research question: what is future self complementarity, and how does it influence an individual's ability to proactively and adaptively manage their career? We discuss our studies' theoretical implications, highlighting significant future research directions inspired by these findings. We also discuss the limitations of these studies, as well as managerial implications.

Theoretical Implications

We found that future self complementarity predicted proactive career behavior (over and above established predictors), whereas its relationship with career adaptability was less consistent. We further showed that vitality was a mechanism through which future self complementarity related to proactive career behavior, providing support for the notion that future self complementarity boosts energy levels because it amplifies the energizing effect of future self representations in the future self network. Conceptualizing (1) a future self as a network of cognitive representations *and* (2) future self complementarity as the extent of mutually beneficial connections between these representations provides a powerful insight into how individuals proactively shape their careers, given the veritable welter of future possibilities. In short, our network-based approach to the future self allows for understanding how its complementarity influences individuals' efforts to manage their career, even when the future is not a singular destination that is easily imagined (cf. Strauss et al. 2012).

Expanding Our View of the Future with Future Self Complementarity. We contribute to the literature on how careers and future selves interplay. Individuals are expected to be most satisfied when their job and career match their overall career interests, values, and preferences (Nauta 2010). Correspondingly, society encourages individuals to pursue the career they envision and to realize their dreams, despite economic, social, and political constraints limiting such opportunities (Hall et al. 2018). This necessarily requires "the possession of a clear and stable picture of one's goals, interests, and talents" (Holland et al. 1980b, p. 1191). The clearer the future career goal, the better.

In the careers literature, an individual's career self-concept can either be cohesive, clear, singular, and focused or—more rarely—flexible, allowing for ambiguity and multiple alternatives (Modestino et al. 2019). Complementarity offers an alternative approach: by finding complementary connections between the cognitive representations of different possibilities, individuals can hold a multiplicity of interconnected alternatives without the need to discard some in favor of others.

Our studies promote complementarity as an important, yet unexplored, characteristic of the future self. First, they challenge the assumed preeminent importance of "a clear vision" (i.e., salience) of the future self (Strauss et al. 2012). To wit, it is theoretically possible to *clearly* imagine different qualities or experiences as part of one's future self without seeing any connections between them. Our findings support the notion that, over and above a clear vision, future self complementarity influences efforts to shape one's career. That said, future self complementarity and future self salience may also influence each other, and we found them to be positively related. Future research may explore contexts where future self complementarity and salience are mutually amplified or dampened.

Studies that have focused on future self narratives have so far focused on elaboration, the degree of detail and complexity held within these future selves (Strauss et al. 2012, Ladge and Greenberg 2015), rather than on complementarity among the myriad cognitive representations they contain. Narratives that are more elaborate have been found to strengthen the effects of future self salience on proactive career behavior (Strauss et al. 2012). Current work on career identity also would suppose that individuals construct a linear "storyline," where incompatibilities are "narrated" or "written out" of the story. Yet, this again predominately assumes salience (i.e., clarity) as the future self's main quality. We challenge this assumption in that our future self network approach makes room for multiple alternatives when individuals have complementary cognitive representations.

Intrapersonal Identity Networks. We further contribute to the literature adopting an intrapersonal identity

network approach (Ramarajan 2014). In this literature, networks consist of interconnected identities (Ramarajan 2014, Bataille and Vough 2022), linked through conflicting or enhancing ties (Ramarajan et al. 2017a, b). We build on this perspective by focusing on the network of the future-oriented cognitive representations contained within a future self, echoing previous research that has focused on broad and potentially domain-spanning future selves (Ladge et al. 2012), work selves (Caza et al. 2018a), or future work selves (Strauss et al. 2012).

Our findings show the effects of complementarity within these future selves, adding to prior qualitative studies. Although prior research has identified identity work strategies through which individuals reconcile tension between different elements of their self (Caza et al. 2018a), our network approach conceptualized the resulting outcome, complementarity at the level of the (future) self. We also offer a methodology to assess complementarity, allowing for theoretical claims to be tested.

Future Self Complementarity Engenders Vitality and Energy. Our conceptualization of a future self as a network of cognitive representations sheds light on the process through which helpful connections among the different elements of future selves facilitate efforts to bring about the desired future. Although enhancing relationships between components of the self have received less attention than conflictual ones (Ramarajan 2014), they are expected to allow individuals to simultaneously meet the expectations of multiple identities (Brook et al. 2008), expanding social resources through diverse contacts and brokering opportunities (Dutton et al. 2010). Leveraging an associative network perspective, we identify vitality as a critical process through which people reap the benefits of complementary connections between different elements of their (future) self. Our studies thus speak to the positive organizational scholarship literature in providing evidence for a key psychological process through which future self complementarity contributes to career growth.

Limitations

Across multiple studies, we found consistent evidence linking future self complementarity to proactive career behavior and some support for its tie to career adaptability. Yet, our studies have several limitations. Except for the behavioral measure in Study 4, we relied on self-report measures. Although we took measures to mitigate the potential impact of common method variance through time-lagged and experimental designs, not all method bias can be ruled out. For example, social desirability could affect the ratings of complementarity between representations, and the emphasis on positive connections that may transfer energy in the high future self complementarity conditions may have contributed to participants' sense of vitality. Future research should investigate the relationship of future self complementarity with objective career outcomes and externally rated career behaviors, as well as with more neutral manipulations to mitigate these concerns.

Studies 3 and 4 provide support for the proposed causal direction of the relationship between future self complementarity, vitality, and proactive career behavior. However, it is conceivable that the relationship between future self complementarity and these outcomes is, in fact, reciprocal. For example, seeking advice on one's career may help individuals see complementarity between representations of their future self. We explored the cross-lagged relationships between future self complementarity and our outcomes in a set of autoregressive path models in an additional longitudinal study ($n = 290$; see Online Supplement 7 for details). The cross-lagged relationship between future self complementarity at T1 and proactive career behavior at T2 was significant ($B = 0.19$, $SE = 0.09$, $p = 0.027$; see Table S7.3, Model 1), whereas the cross-lagged relationship between proactive career behavior at T1 and future self complementarity at T2 was not. However, neither of the cross-lagged relationships involving career adaptability were significant. In contrast to proactive career behavior, there was thus inconsistent support for career adaptability as an outcome of future self complementarity. In line with the findings of Study 4, this suggests that career adaptability may be less susceptible to short-term changes.

With the exception of Study 4, we tested our hypotheses in samples of full-time employees and working-age adults. Although efforts to shape one's career remain relevant throughout life, future self complementarity may be particularly relevant when people are facing a career or role transition. We tested this by replicating our main findings in an additional sample of MBA students approaching graduation (see Online Supplement 12). Again, future self complementarity was positively related to career adaptability and proactive career behavior. Future research could explore the effects of future self complementarity in samples facing career change, in which future selves are likely to be particularly impactful.

We proposed that future self complementarity indirectly influences outcomes via vitality and found consistent support for proactive career behavior. We suggested that vitality arises from energy spreading along mutually beneficial connections in the future self network, but cannot rule out alternative mechanisms. One plausible mechanism, a more efficient use of resources, was tested in additional studies (see Online Supplements 11 and 13) but lacked support. Nevertheless, additional mechanisms may be at play, and the effect on career adaptability in particular

could be driven by other processes—for example, greater cognitive flexibility. Being able to access multiple identities simultaneously promotes flexible thinking, creativity (Gaither et al. 2015), and perspective taking (Ramarajan et al. 2017b). Similarly, complementarity may influence career adaptability not via vitality, but by broadening the way individuals think about their career, contributing to their curiosity and flexibility. In complementary networks, activation can travel along numerous pathways, making it easier for multiple representations to be activated simultaneously. Beyond the resulting energizing effects on vitality we focused on, complementarity may also mean that a greater range of future possibilities can be brought to mind at the same time and inform individuals' decision making, providing them with more room to maneuver.

Future Research Directions

Dynamics and Interplay with Future-Oriented Identity Work. Future research will be able to build on our network perspective to investigate the dynamics of future self complementarity. Abrupt or gradual career transitions, such as job loss (Haynie and Shepherd 2011) or denied promotions (Vough and Caza 2017), require individuals to revise their future self and likely alter the structure and size of future self networks, as cognitive representations are added, dropped, or reconfigured.

Future work could also explore how complementarity evolves through cognitive identity work, the self-reflective process of questioning, changing, and making sense of who we are or want to become (Caza et al. 2018b). Given that research on identity work has been largely theoretical or qualitative in nature, capturing (future) selves as networks of representations and studying their dynamics would provide a means of testing theory related to identity processes quantitatively.

Our approach bridges idiographic and nomothetic perspectives by treating each future self network as unique, yet measurable, allowing for comparisons across individuals and over time. For example, post-traumatic growth (Maitlis 2009) could manifest as increased network size and complementarity, whereas the shift from identity play to identity work (Ibarra and Petriglieri 2010) may involve initial exploration of multiple future possibilities without complementary connections, followed by selective refinement (Ibarra 2003) and increased complementarity. Future research could examine how these network dynamics shape the present self, as concrete identities may eventually crystalize and emerge from the network of possibilities, and explore how individuals revise their future self in response to threats and opportunities (Bataille and Vough 2022), ultimately influencing outcomes such as well-being. Future studies may also explore how structural characteristics of future self networks, such as their size and density, in turn influence their development over time. For example, positive and negative feedback could shape how the network evolves, causing it to expand, stabilize, or shrink. New representations could emerge through the interaction of existing representations. Complementary networks may also be more resilient and adaptive in response to setbacks, changing in response to the environment, while maintaining a stable core.

A dynamic perspective on future self networks and their effects could also be informed by an information-processing perspective. Initial assessment of the complementarity between representations likely relies on rule-based processing (Smith and DeCoster 2000): It is structured by language and logic and subjectively effortful; likely occurs with conscious awareness; and requires attentional resources. Yet, over time, through repeated use, information processing of complementary representations may draw increasingly on associative processing which occurs automatically (Smith and DeCoster 2000), so that complementary representations are then activated together without conscious awareness. Both associative processing and rule-based processing likely have a role to play, and their respective contributions may change over time. Future research may explore the information-processing modes involved in the future self network—and how they evolve—and also explore the role of cognitive ability, especially verbal fluency, as a potential confound.

Individual Differences. Future research could also investigate individual differences that influence future self complementarity and its development over time. For example, career identity was consistently related to future self complementarity, suggesting that those identifying strongly with their career spend more time contemplating their future self and find complementarity between its representations. Some individuals may be predisposed to greater future self complementarity—for example, because they are able to more vividly imagine a positive future (Blackwell et al. 2013), have a strong need for cognitive closure (Webster and Kruglanski 1994), or because their future self complementarity is reflective of complementarity in their current self. Our work also has implications for research on cognitive complexity, the ability to identify a greater number of separate concepts or dimensions related to a particular topic (differentiation) and to draw connections between them (integration) (Conway et al. 2014). In relation to the self-concept, it reflects "the number and distinctiveness of self-aspects a person uses to think about himself or herself" (Linville 1987, p. 666). Our network approach to the future self instead reflects complexity by capturing the multiplicity of distinct future-oriented representations and the connections between them. The cognitive complexity literature, in turn, suggests that future self complementarity may be

influenced by cognitive complexity's likely trait component (Woodard et al. 2021). Future studies adopting an intrapersonal network approach to future selves and their development could thus further our understanding of the role of individual differences in identity-related processes, which is extremely limited to date.

Beyond Career Development. Our approach incorporates both personal and professional future-oriented cognitive representations in the study of future selves and aims to offer a holistic understanding of how individuals navigate their careers, as future selves often span multiple domains (Ladge et al. 2012). Work and personal identities are increasingly intertwined (Ramarajan and Reid 2013), and proactive career behaviors, such as proactive skill development or networking, are likely driven by personal as well as professional representations of the future. For instance, proactive career behaviors may be aimed at achieving greater flexibility or financial stability, potentially improving work-life balance or supporting family goals. Future research could further investigate how complementarity influences other future-oriented behaviors such as job or leisure crafting, expanding our understanding of how individuals work toward their domain-spanning future selves.

Practical Implications

Our findings offer insights into how individuals can cultivate proactivity in managing their careers and how managers can effectively support and encourage this process. Given that its effect sizes are comparable to those of established predictors of our outcomes, future self complementarity provides a viable alternative path for fostering proactive career behaviors, such as seeking career advice and developing skills for the future.

This is particularly relevant, as with ongoing disruption from technology (e.g., artificial intelligence), geopolitics, and other factors, predicting stable career paths has become increasingly difficult. As a result, having a clear and stable vision for one's career may be of limited use. Our results, therefore, support a different approach wherein individuals with higher future self complementarity are better prepared to proactively respond to uncertainty—likely allowing for more flexible career trajectories. Focusing on complementarity is indeed very distinct from the plethora of career-coaching approaches that place a premium on clarity. As our experiments demonstrate, *future* self complementarity can be cultivated through interventions, much like how individuals can come to recognize previously unseen relationships between their *current* identities (Ramarajan et al. 2017b). Managers and career coaches—whether within organizations or development programs (e.g., Executive MBAs)—could leverage these interventions to engage their employees or clients in finding complementarity in their future self to promote proactive skill development and networking.

We further showed that vitality is a key mediator that connects future self complementarity and important career outcomes (especially proactive career behavior). As such, we suggest that managers and organizations would do well to build upon the energy or vitality that comes from future self complementarity to create more structured pathways for career development. For example, future-self-based interventions could be an input into HR processes that match employees' future self representations with opportunities for skill development and the like within the organization—thus promoting not only proactive career behavior, but also retention. Employers, employees, and career coaches alike may focus on how future self complementarity allows for the realization of the multiplicity of possibilities that make up the future self—within the organization.

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Endnotes

[1] Cognitive representations, a pervasive concept in cognitive science, reflect information encoded in individuals' memory (Rumelhart and Norman 1988). This includes information about the self (Greenwald and Pratkanis 1984), and specifically information about what may be possible or desirable for the self in the future (Markus and Nurius 1986).

[2] An alternative approach would have been to allow participants to freely generate representations. A supplementary study using this method showed broadly similar patterns of association between future self complementarity and related constructs (see Online Supplement S2). Although some individual correlations differ in significance across approaches, none of the differences were statistically significant when formally tested (Fisher's z-transformation; Cohen et al. 2003), suggesting that future research may employ either method.

[3] As the number of relationships to be rated increases exponentially with network size, providing an upper limit is important to manage participant fatigue and response quality. In Online Supplement 4, we present a supplementary study which systematically examines how the choice of the upper limit affects the measure and its relationships with other variables. This can inform researchers' choice of upper limit, balancing response time constraints, measure accuracy, and statistical power considerations. Correlations between future self complementarity and other variables in the nomological net remain relatively stable between cut-offs of 25 and 20, decline between cut-offs of 20 and 10, and have a sharper decline between cut-offs of 10 and 5.

[4] Following the suggestion of an anonymous reviewer, we also developed a Likert scale of future self complementarity (see Online Supplements 6 and 7). Correlations between the network-based measure and the Likert scale were small but significant (T1: $r = 0.19$, $p = 0.002$; T2: $r = 0.13$, $p = 0.03$), and the network-based measure

predicted career adaptability and proactive career behavior controlling for the Likert scale, supporting its incremental validity.

[5] We further examined the relationship of future self complementarity with career adaptability and proactive career behavior in a temporally lagged study of 141 Prolific respondents over two weeks. Controlling for age, future self salience, career identity, career aspirations, and future orientation (Strauss et al. 2012), as well as the size of the network, and future self conflict, future self complementarity was significantly related to career adaptability ($B = 0.36$, $SE = 0.14$, $t = 2.60$, $p = 0.01$) and proactive career behavior ($B = 0.33$, $SE = 0.16$, $t = 1.98$, $p = 0.049$; see Online Supplement 8).

[6] There were no significant differences between participants who only responded at Time 1 and participants who responded at both Time 1 and Time 2 in future self salience ($t(671) = -1.33$, $p = 0.18$), career identity ($t(669) = -0.29$, $p = 0.76$), future orientation ($t(669) = 0.71$, $p = 0.46$), size of the future network ($t(672) = -1.13$, $p = 0.26$), future self complementarity ($t(672) = -0.99$, $p = 0.32$), future self conflict ($t(672) = -0.02$, $p = 0.98$), and vitality ($t(671) = 0.82$, $p = -0.42$). Participants who responded only at Time 1 were slightly older ($M = 44.0$) than participants who responded at both time points ($M = 41.3$; $t(670) = 2.70$, $p = 0.007$). Participants also differed in their distribution across hierarchical levels ($\chi^2(5) >= 12.26$, $p = 0.03$), such that participants who responded only at Time 1 were less likely to hold a position without supervisory responsibilities than participants who responded at both time points (25.6% versus 40.1%) and more likely to hold an upper middle management position (26.7% versus 16.7%).

[7] The pattern and significance of findings remain the same, even if these extreme outliers are included.

[8] Because the manipulation required participants to reflect about 15 pairs of representations, we excluded participants who selected *fewer than six* representations in the first stage ($6 \times (6-1)/2 = 15$ pairs). In our preregistration, we had erroneously specified to exclude participants who select *fewer than five* representations.

[9] A minimum of four representations was necessary to make at least five pairs. The maximum of 15 was chosen, given that in the main study the rating of all pairs would take place in a workshop with limited time available.

[10] As full participation required students to write brief statements as part of the reflection exercise, we checked the submitted statements and excluded three students from the sample who submitted nonsensical comments.

[11] We had preregistered that we would exclude students who did not complete the postworkshop homework, but chose to include them in the analysis. This decision was made because, at the time of preregistration, we were not aware that students were allowed to skip one homework. Because our workshop was the last session in the course, a large proportion of students (26%) chose to skip the postworkshop homework, which would have significantly reduced the sample size. Importantly, outcome measures were collected in a separate follow-up survey, and not as part of the postworkshop homework, which means that students who skipped the homework could still be included in the main analysis. In addition, we had preregistered a test of efficient resource use as an alternative mediator; results for this analysis can be found in Online Supplement 11.

[12] Although we preregistered an additional later survey including one more measurement of proactive career behavior and career adaptability, for course-logistical reasons, we could not run this survey and thus only collected these data once.

[13] This approach deviates from our preregistered analysis plan, which did not take the clustering of observations into account. In Online Supplement 11, we report the preregistered analyses and provide robustness checks in which we cluster by teaching assistant rather than by workshop, which yields the same substantive conclusions.

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